

TOSHIBA Photocoupler GaAs IRed & Photo-Transistor

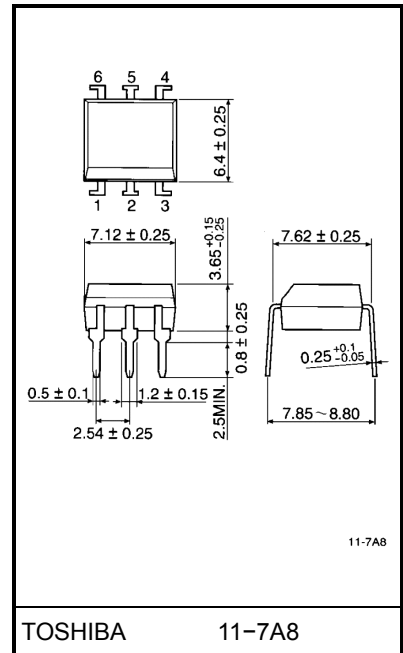
# TLP630

Programmable Controllers  
 AC / DC-Input Module  
 Telecommunication

The TOSHIBA TLP630 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel in a six lead plastic DIP package.

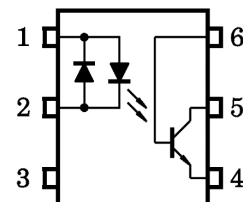
- Collector-emitter voltage: 55V min.
- Current transfer ratio: 50% min.  
     Rank GB: 100% min.
- Isolation voltage: 5000Vrms min.
- UL recognized: UL1577 file no. E67349

Unit in mm



Weight: 0.4g

### Pin Configurations(top view)



- 1 : ANODE, CATHODE
- 2 : CATHODE, ANODE
- 3 : N.C.
- 4 : EMITTER
- 5 : COLLECTOR
- 6 : BASE

## Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_{F(RMS)}$	60	mA
	Forward current derating (Ta ≥ 39°C)	$\Delta I_F / ^\circ C$	-0.7	mA / °C
Detector	Peak forward current (100µs pulse, 100pps)	$I_{FPT}$	±1	A
	Collector-emitter voltage	$V_{CEO}$	55	V
	Collector-base voltage	$V_{CBO}$	80	V
	Emitter-collector voltage	$V_{ECO}$	7	V
	Emitter-base voltage	$V_{EBO}$	7	V
	Collector current	$I_C$	50	mA
	Power dissipation	$P_C$	150	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ C$	-1.5	mW / °C
Operating temperature range		$T_{opr}$	-55~100	°C
Storage temperature range		$T_{stg}$	-55~125	°C
Lead soldering temperature action temperature		$T_{sol}$	260(10s)	°C
Junction temperature		$T_j$	125	°C
Total package power dissipation		$P_T$	250	mW
Total package power dissipation derating		$\Delta P_T / ^\circ C$	-2.5	mW / °C
Isolation voltage (AC, 1 min., R.H. ≤ 60%)		$BV_S$	5000	Vrms

## Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_{F(RMS)}$	—	16	25	mA
Collector current	$I_C$	—	1	10	mA
Operating temperature	$T_{opr}$	-25	—	85	°C

## Individual Electrical Characteristics (Ta = 25°C)

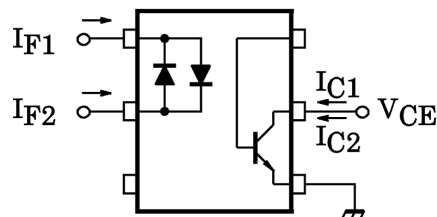
Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Forward current	$I_F$	$V_F = 0.7\text{V}$	—	2.5	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector dark current	$I_D(I_{CEO})$	$V_{CE} = 24\text{V}$	—	10	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
	Collector dark current	$I_{CBO}$	$V_{CB} = 10\text{V}$	—	0.1	—	nA
Capacitance (collector to emitter)	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	10	—	pF	

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Base photo-current	$I_{PB}$	$I_F = \pm 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	$\mu\text{A}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
Off-state collector current	$I_{C(off)}$	$V_F = \pm 0.7\text{V}, V_{CE} = 24\text{V}$	—	1	10	$\mu\text{A}$
CTR symmetry	$I_{C(ratio)}$	$I_C(I_F = -5\text{mA}) / I_C(I_F = +5\text{mA})$ (Note 1)	0.33	1	3	—

(Note 1)

$$I_{C(ratio)} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 5\text{V})}$$



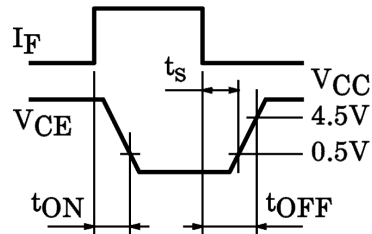
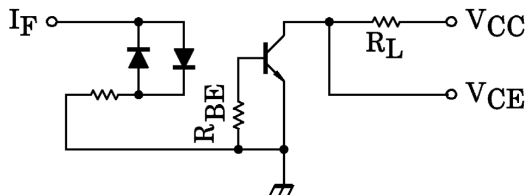
## Isolation Characteristics (Ta = 25°C)

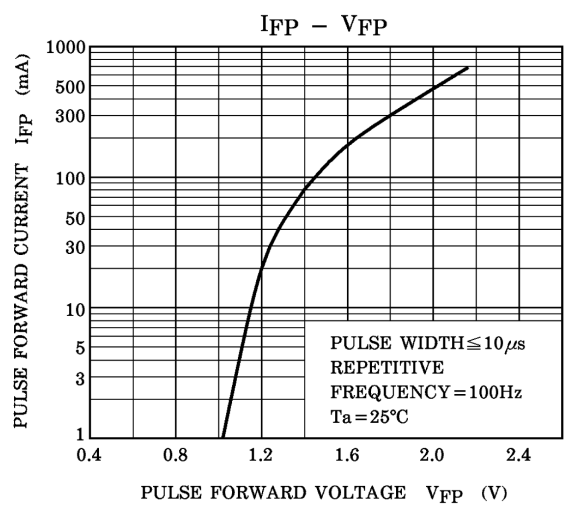
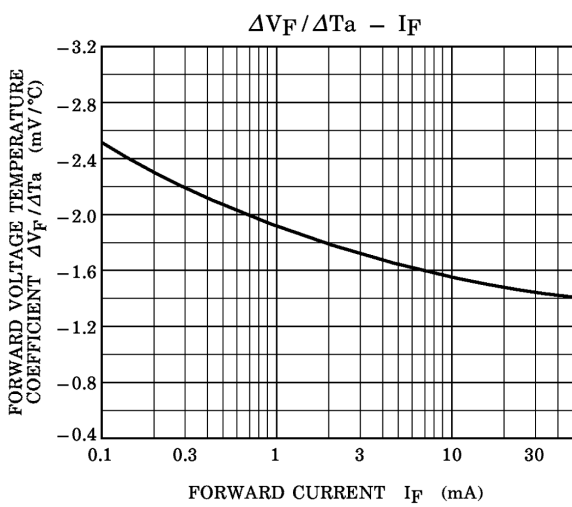
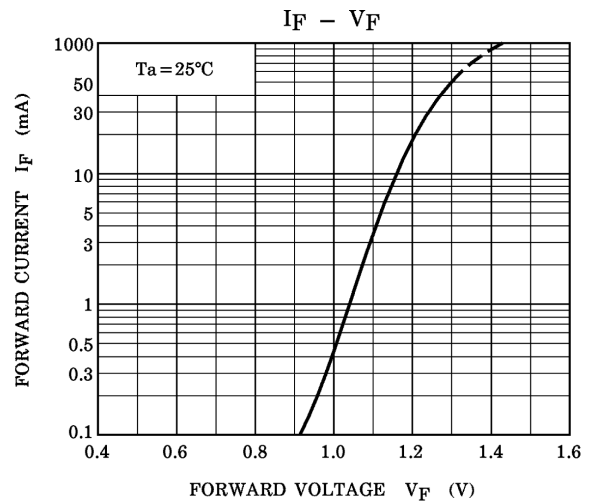
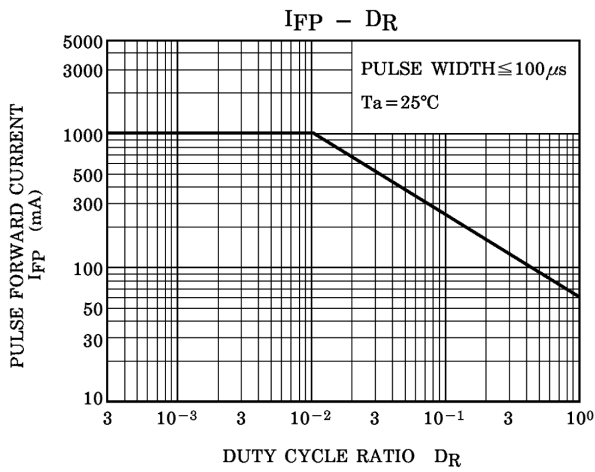
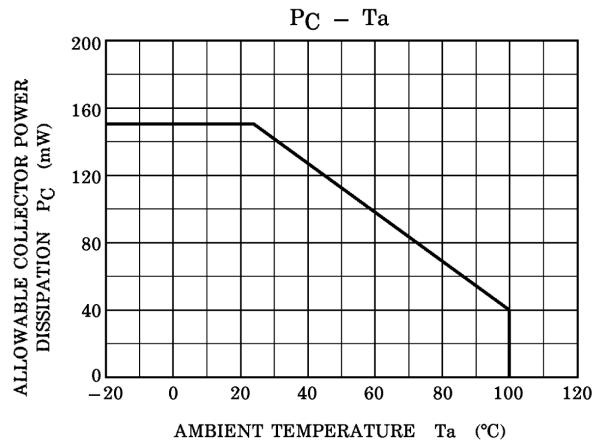
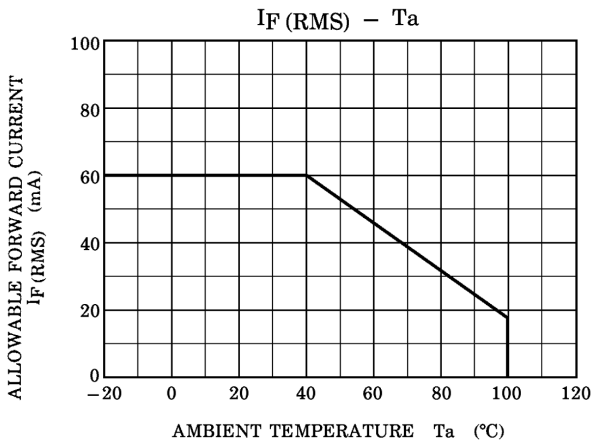
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500V, R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

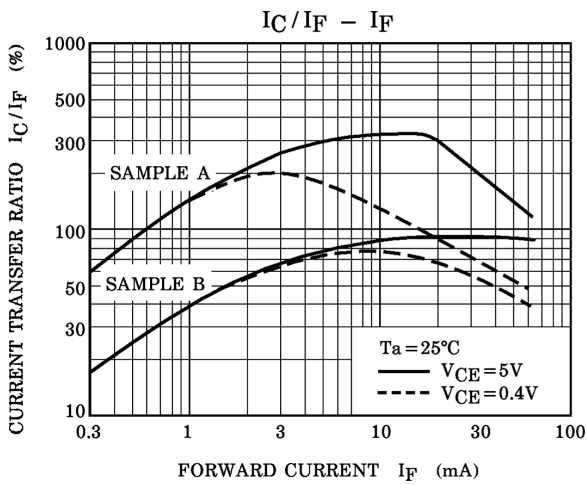
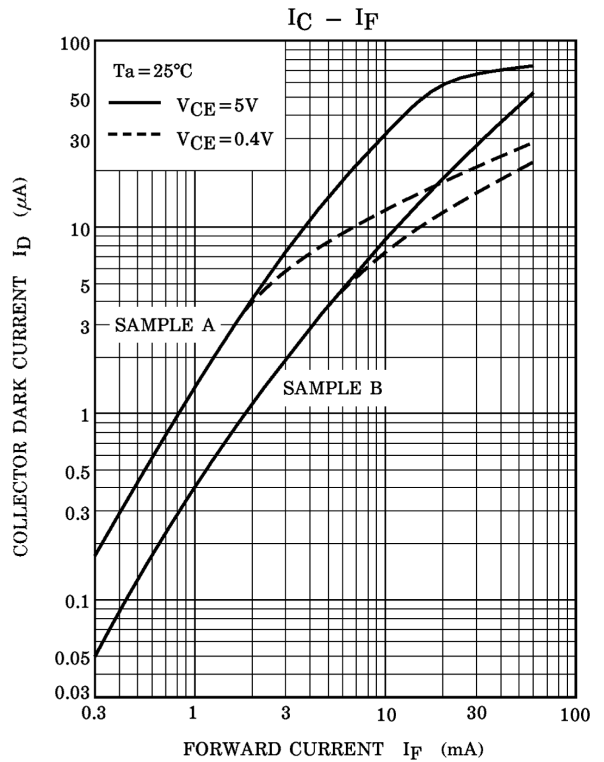
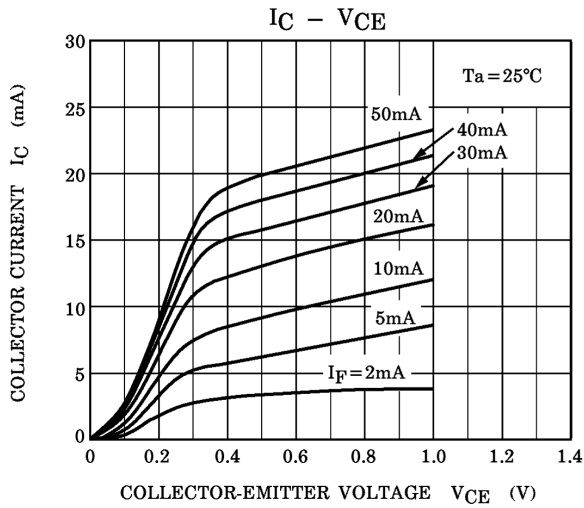
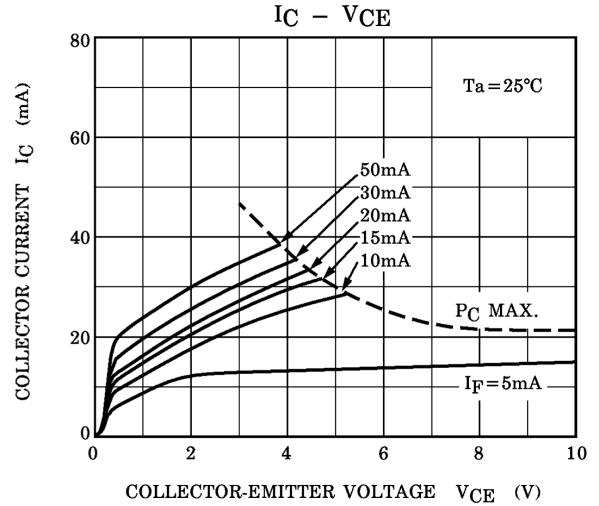
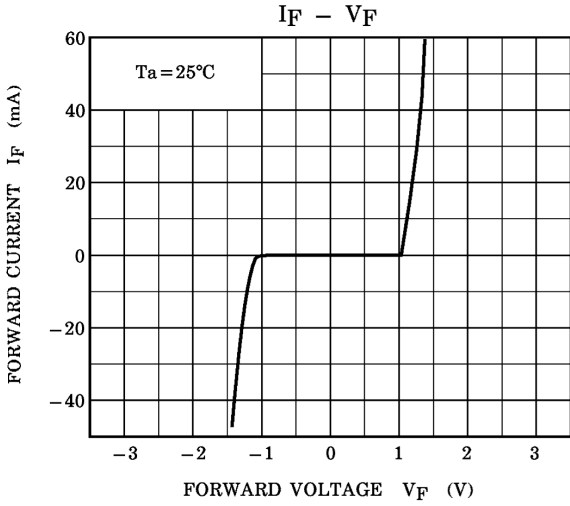
## Switching Characteristics (Ta = 25°C)

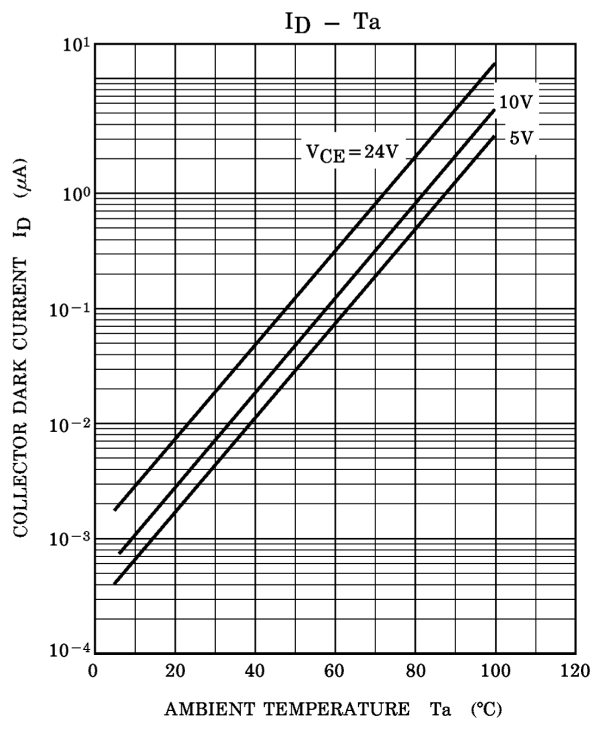
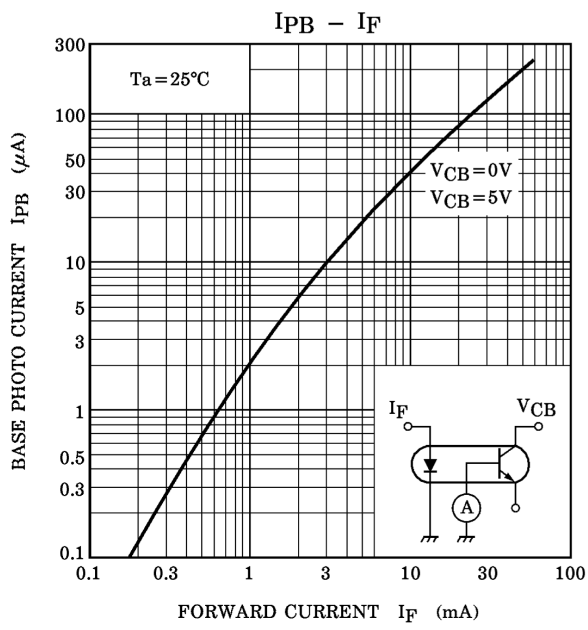
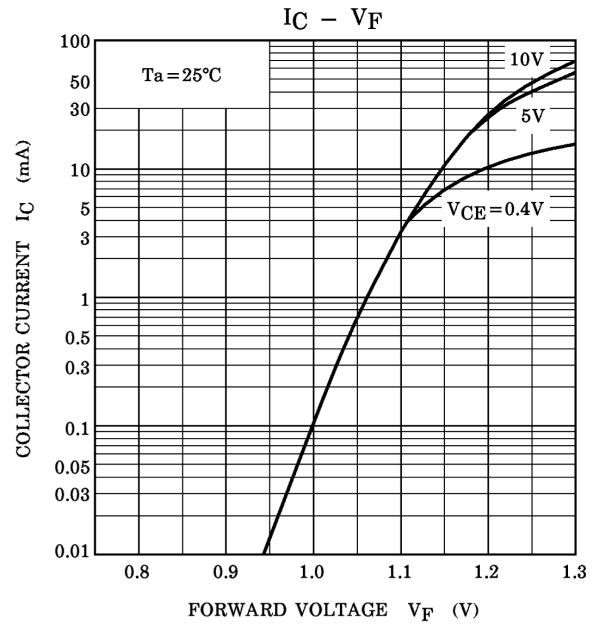
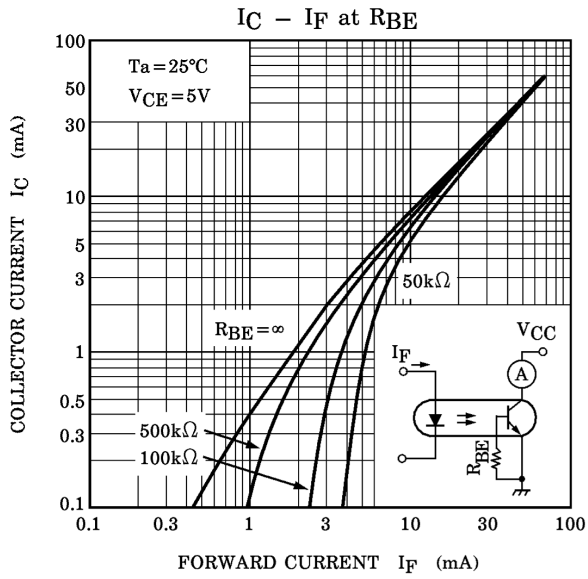
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10V, I <sub>C</sub> = 2mA R <sub>L</sub> = 100Ω	—	2	—	μs
Fall time	t <sub>f</sub>		—	3	—	
Turn-on time	t <sub>ON</sub>		—	3	—	
Turn-off time	t <sub>OFF</sub>		—	3	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 1.9 kΩ (Note 2) R <sub>BE</sub> = OPEN V <sub>CC</sub> = 5 V, I <sub>F</sub> = ±16mA	—	2	—	μs
Storage time	t <sub>S</sub>		—	15	—	
Turn-off time	t <sub>OFF</sub>		—	25	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 1.9kΩ (Note 2) R <sub>BE</sub> = 220kΩ, V <sub>CC</sub> = 5 V I <sub>F</sub> = ±16mA	—	2	—	μs
Storage time	t <sub>S</sub>		—	12	—	
Turn-off time	t <sub>OFF</sub>		—	20	—	

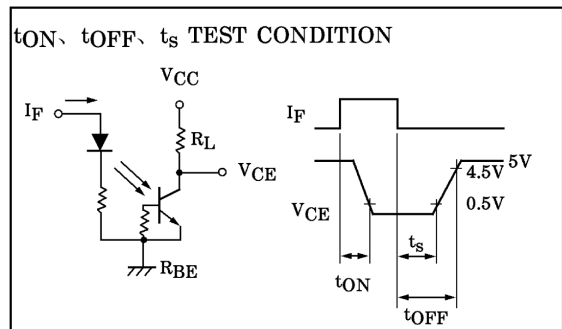
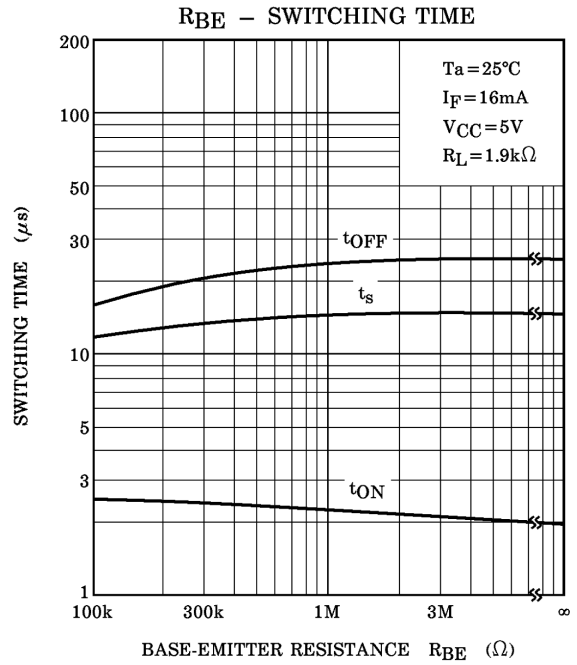
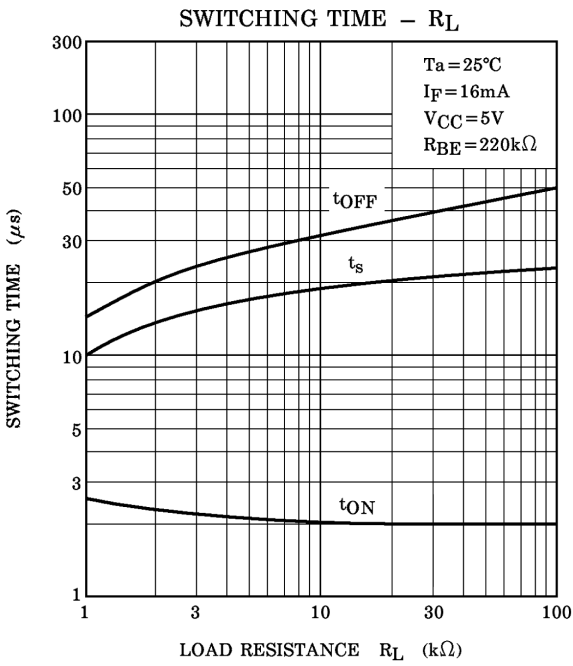
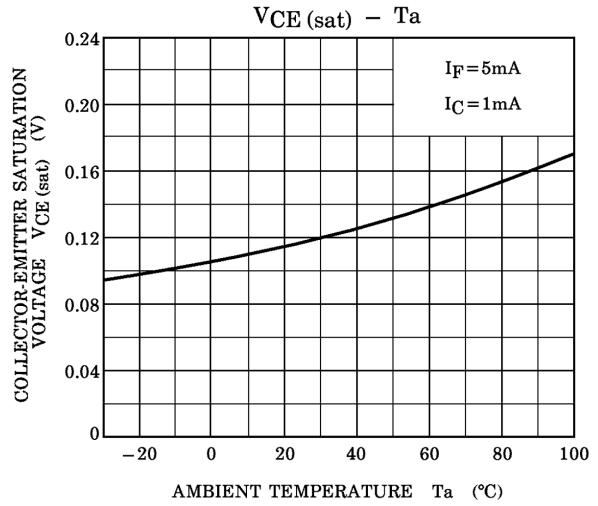
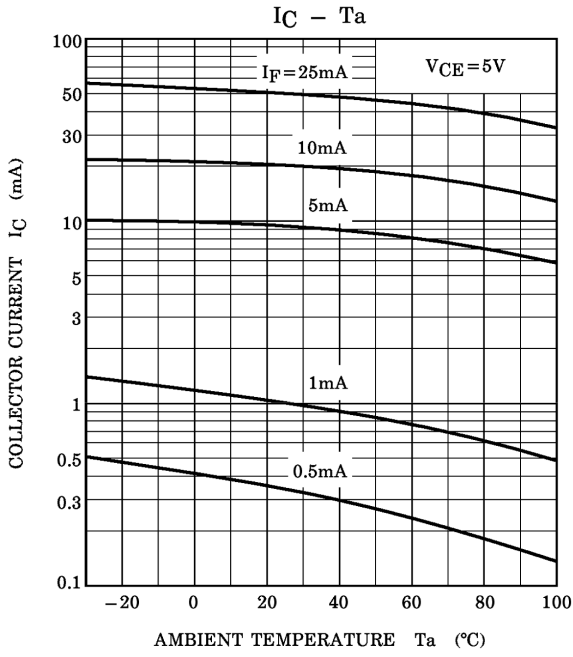
(Note 2) Switching time test circuit













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